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# JOURNAL OF DENTAL MEDICINE

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(*Quoted from the Constitution*)

"To promote the study and dissemination of knowledge of the cause, prevention and control of diseases of the teeth, their supporting structures and adnexa and related subjects; and to foster and promote a better scientific understanding between the fields of dentistry and medicine."

# THE JOURNAL OF DENTAL MEDICINE

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# NUTRITION AND ORAL CONDITIONS

## BIBLIOGRAPHY AND ABSTRACTS OF THE LITERATURE FROM 1939-1951

*Edited by*

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This article, published as a supplement to the Journal of Dental Medicine, is an attempt to satisfy the needs of the busy practitioner who is interested in problems of nutritional research and its literature.

It is hoped that it will prove to be a useful contribution to medicine and dentistry and that it will foster a closer relationship between these professions.

PUBLICATIONS COMMITTEE

## Introduction

The literature pertaining to nutrition and dental disease is voluminous. Dentists can, with this brochure, keep informed as to research and the application of nutrition as well as vitamin therapy in their daily practices. The bibliography and literature pertaining to caries has been purposely limited because the work in this field is rather complete.

The outline was arranged according to conditions, authors and vitamins reported in the articles. Those interested in the subject of dental nutrition can find, at a glance, a concise outline and abstract of the authors' reports.

Some of the publications would not lend themselves to the outline. A list of those articles along with their short summaries was compiled alphabetically.

This brochure is the result of the combined efforts of the editor and the Society for Dental Research of New York University College of Dentistry. Special mention must be made for the exacting standards set by students Marvin Yarin, Irving Rissler and David Faigel. The other students participating in this project were: Herman Belkin, Stanley Lamberg, Ralph Magaler, Richard Simses, Jarvis Metnick, Jerry Goodman, David Greene and Addison Bowman. Thanks must also be given to Helen Hlavac, librarian, for her many kindnesses.

The original format was revised and a new one made. Special credit is given to students Edwin Dickman and Paul Feldman of the Dental Research Society for organizing and bringing the new form up to date.

The editor wishes to thank E. R. Squibb & Sons for their cooperation.

Harry Roth, B.S., D.D.S.
*Editor*

## *Conditions associated with vitamin A deficiencies*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS |
|---|---|---|
| Atrophy and metaplasia of enamel and dentin | Scott, H. T. | |
| | Sukin, L. | |
| Acute necrotizing ulcerative gingivitis (Vincent's infection) | Gunther, E. | |
| | Kirkpatrick, R. M. | 1976 patients |
| | Wilkie, A. | 9 patients |
| | | 42 patients |
| | | 30 patients |
| Bacterial growth (excess) on teeth, and lack of resistance to their presence | Leonard, H. J. | |
| Cutaneous lesions | Radusch, D. | |
| Eruption, delayed | Sukin, L. | |
| Gingival hypertrophy | Sukin, L. | |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Prevention: 4000 USP units daily for adults from milk, eggs, butter, cheese, liver, carrots, leafy vegetables, fish liver oils. | Atrophy of epithelium (including enamel organ) occurs, resulting in tooth deformities probably due to vitamin A deficiency. |
| | (1) Deficiency best detected by biophotometric examination of eyes, also laboratory tests using blood serum or urine.<br>(2) Vitamin A plus antimony trichloride produces a blue color. |
| Treatment: Vitamin A, B-Complex, C. | Results satisfactory with multiple vitamins. |
| Cause: Deficiency of vitamins A and B associated with Vincent's infection. | Percentage of natives on vitamin A and B deficient diets who presented acute or subacute Vincent's was substantially greater than percentage of those on diet containing sufficient vitamin A and B. |
| Vitamin A 24,000 I.U. daily.<br>Vitamin C. daily.<br>Nicotinic acid 50-250 mg. | Some cases of Vincent's infection are influenced by a deficiency of vitamin A.<br>Vitamin C therapy aids physiologic repair in Vincent's infection.<br>Nicotinic acid plays no effective role. |
| Cause: Vitamin A deficiency | Other causes of these conditions are: overeating, vitamin D, C, and thiamine deficiency. |
| Cause: Vitamin A deficiency | Vitamin A is affected by minerals and cooking. |
| | Refers to dental abnormalities associated with nutritional deficiencies. |
| | No conclusion drawn. |

CONDITIONS ASSOCIATED WITH VITAMIN A DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT OF VITA |
|---|---|---|---|
| Gingivitis, desquamative | Bacchi, J. G. | | Treatm vitamir supple |
| Glossitis | Bacchi, J. G. | | Treatm vitamir supple |
| Hyperkeratinization of oral mucous membrane | Ziskin, D. and co-workers | 2 female Rhesus monkeys | Vitami (I.U.) |
| Hypoplasia of teeth | Dinnerman, M. | 6 infants (3-21 mos.) | Cause diets. |
| | Kerr, D. A. | | Cause deficie |
| | Lerner, H. H. | | Cause deficie Treatr nation |
| Hypovitaminosis A | Boyle, P. E. | Guinea pigs | Cause vitami pigs. |
| Hypovitaminosis A and gingival and subgingival tissues | King, J. D. | Albino-rats | Cause vitam (long feedir |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: large doses vitamin A; B-complex and supplement vitamin C. | Results proved effective. |
| Treatment: large doses vitamin A; B-complex and supplement of Vitamin C. | Satisfactory results. |
| Vitamin A, 10,000 units (I.U.) for 31 days. | Administration of vitamin A proved effective. |
| Cause: Vitamin A deficient diets. | (1) Vitamin A deficiency produces alterations of enamel-forming cells to a non-specialized epithelium, and atrophy of enamel organs.<br>(2) Result in enamel hypoplasia – as tears, canals, or deeply stained interprismatic substance. |
| Cause: Vitamin A deficiency | (1) Vitamin A deficiency produces pathologic changes in epithelial structures; thus, enamel organ is changed, with resulting complete or partial interference with enamel formation.<br>(2) Vitamin A is of little value dentally, after teeth have been completely formed. |
| Cause: Vitamin A deficiency.<br>Treatment: 20,000 International Units per day. | Viatmin A deficiency results in atrophy of epithelial tissues, thus influencing the enamel formation by the epithelial enamel organ. |
| Cause: diets deficient in vitamin A fed to guinea pigs. | (1) Found retardation of bone formation (including alveolar bone).<br>(2) No predisposition to gingival infection. |
| Cause: Diets deficient in vitamin A and/or carotene (long-term post-natal feeding) | (1) Hyperplasia of gingiva, thickening of keratinous outer layer and subgingival epethelium.<br>(2) Author feels vitamin A deficiency is predisposing factor in periodontal disease. |

CONDITIONS ASSOCIATED WITH VITAMIN A DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT A OF VITAMI |
|---|---|---|---|
| Hypovitaminosis A and post-extraction healing | Hirschi, R. G. | 40 hamsters | Cause: V deficient |
| Leukoplakia | Bacchi, J. G. | | Treatme itamin plement |
| Maternal vitamin A deficiencies (with subsequent effects on offspring) | Mellanby, H. | 30 female rats (19 were controls) | Cause: deficien |
| Periodontitis, suppurative | Kirkpatrick, R. M. | 1976 patients | Cause: itamin |
| ***Conditions associated with vitamin $B_1$ (Thiamine) deficiencies*** | | | |
| Angular Fissuring | Kerr, D. A. | | Thiami |
| Aphthae | Sukin, L. | | |
| Bacterial Growth (excess) on teeth and lack of resistance to their presence | Leonard, H. J. | | Cause: deficien |
| Herpes Simplex (oral) | Burket, L. W.<br>Hickman, G. C. | | Thiam mgm/c acid 50 |
| Herpetic vesicles (on buccal mucosa, under tongue, on palate) | Weisberger, D. | 2 patients | Thiam Parente |

| MOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Cause: Vitamin A deficient diets. | (1) Gross manifestations of avitaminosis A.<br>(2) Retardation of new bone formation in healing socket was not extreme.<br>(3) Quantity of new bone decidedly less in deficient animals than in controls.<br>(4) Ameloblast and oral epithelium essentially normal. |
| Treatment: Large doses vitamin A; B-complex supplement of vitamin C. | Author found treatment with multiple vitamins effective. |
| Cause: Vitamin A deficient diets. | The longer female was kept on vitamin A deficient diet, the greater effects on dental tissue of offspring. |
| Cause: Diets deficient in vitamins A and B complex. | A significantly greater percentage of natives on diets deficient in vitamin A and B complex had suppurative periodontitis than the percentage of natives on a diet sufficient in these factors. |
| | |
| Thiamine 9 mgm/day | Also Riboflavin 3 mgm/day, Niacin 75 mgm corrected condition. |
| | Complete absence of $B_1$ in urine denotes deficiency. States that $B_1$ is effective. |
| Cause: Thiamine deficiency | Other causes of this condition are over-eating, vitamin D, A, and C deficiency. |
| Thiamine chloride 5 mgm/day (Nicotinic acid 50 mgm/day) | Prompt and satisfying results in cases of solitary herpetic lesions. |
| Thiamine, 30 mgm Parenterally or orally | Evidence is given that administration of vitamins cures lesions in the oral cavity. |

CONDITIONS ASSOCIATED WITH VITAMIN $B_1$ (THIAMINE) DEFICIENCIES *(cont.)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS |
|---|---|---|
| Neuralgia (Facial and Trigeminal) | Lerner, H. H. | |
| Neuralgia (Trigeminal) | Bakins | 7 patients |
| | Borsook, H. | |
| Neuritis (Peripheral) | Spies, T. | |
| Perleche | Kerr, D. A. | |
| Sore mouth (due to ill fitting dentures) | Kerr, D. A. | |
| Tic Douloureux | Bacchi, J. G. | 1 patient |
| Tongue Lesions | Kerr, D. A. | |
| ***Conditions associated with vitamin $B_2$ (Riboflavin) deficiencies*** | | |
| Acute Necrotizing Ulcerative Gingivitis | Kirkpatrick, R. M. | 12 patients |
| Angular Fissuring | Kerr, D. A. | |
| Arthritis | Sinclair, J. A. | |
| Burning Tongue | Sinclair, J. A. | |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Thiamine, 1 mgm/day | Satisfactory results obtained. |
| 10-30 mgm daily thiamine hydrochloride | Symptoms alleviated. |
| 10 mgm thiamine hydrochloride/day intravenously. | Treatment proved effective. |
| Intravenous injection of $B_1$ 50-100 mg/day in doses of 10-20 mgm. | If results not obtained in one week, discontinue. |
| Thiamine 9 mgm/day | Also Riboflavin 3 mgm/day, Niacin 75 mgm effective. |
| Vitamin $B_1$ | Chronic sore mouths have been healed by Vitamin $B_1$ therapy. |
| A & B complex & 50 mgm daily $B_1$ | Multiple vitamins with increased dosage of $B_1$ proved effective. |
| Thiamine 9 mgm/day | Also Riboflavin 3 mgm/day, Niacin 75 mgm effective. |
| Daily: vitamin $B_2$ 2 drachms. Vitamin C-8 oz. Orange Juice. | 2 drachms of yeast extract and 8 oz. orange juice a day maintains health of gingiva. |
| Riboflavin 3 mgm/day | Also Thiamine 9 mgm/day, Niacin 75 mgm. |
| Riboflavin | Also 200-500 mgm. nicotinamide 300-500 mgm. ascorbic acid |
| Riboflavin | Also 200-500 mgm. nicotinamide 300-500 mgm. ascorbic acid |

CONDITIONS ASSOCIATED WITH VITAMIN $B_2$ (RIBOFLAVIN DEFICIENCIES (cont.)

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT OF VITAM |
|---|---|---|---|
| Cheilitis | Ribble, R. D. | 4 patients | $B_2$ large |
| Cheilosis | Lerner, H. H. | | Riboflav |
| | Ostrander, F. O. | | Riboflav |
| | Scott, H. T. | | Liver, flavin 2 adult r |
| | Solloway, R. L. | 1 patient | Ribofla |
| Conjunctivitis | Weisberger, D. | 4 patients | Ribofla intrave |
| Fissures | Solloway, R. L. | 1 | Ribofla |
| Growth of Mandibular Cartilage | Levy, B. M. | Mice | Diets $B_2$ |
| Macerated Red Lesions at Angle of Mouth | Kerr, D. A. | | Ribofla (for 3 |
| Magenta colored Tongue | Scott, H. T. | | Liver, 2.2-3.3 males. |
| Pellagra | Sinclair, J. A. | | Ribofl |
| Perleche | Kerr, D. A. | | Ribofl |
| Tongue Lesions | Kerr, D. A. | | Ribofl |
| | Weisberger, D. | 4 patients | Ribofl intrav |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| $B_2$ large doses intravenously | $B_2$ improved cheilitis and fissures. Tendency towards relapse after treatment. Large dose more effective; intravenous is more effective than oral. |
| Riboflavin 5 mgm/day | Effective. |
| Riboflavin 2-10 mgm/day | Frequently accompanied by magenta glossitis. Symptoms respond readily to therapeutic doses. |
| Liver, vegetables, Riboflavin 2.2-3.3 mgm/day for adult males. | Accompanied by ocular and skin lesions, which also disappear upon administration of therapeutic doses. |
| Riboflavin, orally | Oral dosage cleared up lesions quickly. |
| Riboflavin 1.5 mgm. intravenously | Also Nicotinic acid 200 mgm./day<br>Lesions subsided. |
| Riboflavin, orally | Oral dosage cleared up fissures quickly. |
| Diets deficient in vitamin $B_2$ | Growth of cartilage on the condyle becomes markedy narrower than normal. These changes were reversible with feeding of adequate diets. |
| Riboflavin 5 mgm/day (for 3-20 days) | Obtained complete cures. |
| Liver, vegetables Riboflavin 2.2-3.3 mgm/day for adult males. | Accompanied by ocular and skin lesions, which also disappear upon administration of therapeutic dose. |
| Riboflavin | Also Nicotinamide 200-500 mgm.<br>Ascorbic acid 300-500 mgm. |
| Riboflavin 3 mgm/day | Also Thiamine 9 mgm./day Niacin 75 mgm. |
| Riboflavin 3 mgm/day | Also Thiamine 9 mgm./day Niacin 75 mgm. |
| Riboflavin 15 mgm. intravenously | Also Nicotinic acid 200 mgm/day<br>Treatment effective. |

## *Conditions associated with Niacin deficiencies*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUN OF VITA |
|---|---|---|---|
| Acute necrotizing ulcerative gingivitis (Vincent's Infection) | Berman, W. Blumenfeld, M. | | Treat orally 3 days remai |
| | Hill, E. S. | | Treat Nicot |
| | King, J. D. | 4 patients | Treat day o |
| | Schueuller, C. F. | 5 patients | Treat nicoti days. Intrav |
| | Wilkie, A. C. | 42 patients<br>30 patients<br>9 patients | Vitam Nicot mgm. Vitam daily. |
| | Weisberger, D. | | Treat nicoti |
| Angular fissuring | Kerr, D. A. | | Treat mg/d mg/d |
| Aphthous stomatitis | Hill, E. S. | 15 patients | Treat nicoti |
| Arthritis | Sinclair, J. A. | | Treat 200-5 300-5 |
| Burning tongue | Sinclair, J. A. | | Treat 200-5 300-5 |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: Nicotinamide orally 250 mgm/day first 3 days; 150 mgm/day for remainder of treatment. | Nicotinic Acid plus local measures gives better results than local measures alone. Vitamin therapy is definitely indicated in cases that don't respond to local therapeutic measures alone. |
| Treatment – 1000 mgm. Nicotinic Acid | No changes at end of 5 days. |
| Treatment: 250 mgm. per day of nicotinic acid. | Oral administration produced good results. |
| Treatment: 250 mgm/day nicotinic acid orally for 10 days.<br>Intravenous 50 mg/day | Good results. |
| Vitamin C<br>Nicotinic acid 50-250 mgm. daily.<br>Vitamin A 24,000 I.U. daily. | Multiple vitamins were effective. |
| Treatment: 200 mg/day nicotinic acid. | Satisfactory results. |
| Treatment: Thiamine 9 mg/day; Riboflavin 3 mg/day; Niacin 75 mg/day | Where these vitamins were ineffective patients may have chronic iron deficiency anemia, and Ferrous sulphate (.3g/day) should be prescribed. |
| Treatment: 75-200 mg/day nicotinic acid. | Cure in 3 days. |
| Treatment: Riboflavin; 200-500 mg. nicotinic acid; 300-500 mg. ascorbic acid. | Author considered treatment of temporomandibular arthritis especially effective. |
| Treatment: Riboflavin; 200-500 mg. nicotinic acid; 300-500 mg. ascorbic acid. | Enhanced tissue resistance to stress with multiple vitamin therapy. |

CONDITIONS ASSOCIATED WITH NIACIN DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUN OF VIT |
|---|---|---|---|
| Cheilosis | Sinclair, J. A. | | Treat 200-5 300-5 |
| Conjunctivitis | Weisberger, D. | 4 patients | Treat flavin mg/d |
| Herpes simplex, oral | Burket, L. W.<br>Hickman, G. C. | | Treat chlori tinic a |
| Pellagra | Ostrander, F. D. | 1936 patients | Treat nicoti |
| | Robins, S. | *Discussion* | |
| | Sinclair, J. A. | | Treat 200-5 300-5 |
| Perleche | Kerr, D. A. | | Treat mg./d mg./d |
| Pre-pellegrous condition | Walker, R. O. | | Treat nicoti condi |
| Tongue lesions | Kerr, D. A. | | Treat mg/da mg/da |
| | Weisberger, D. | 4 patients | Treat flavin mg./d |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: Riboflavin; 200-500 mg. nicotinic acid; 300-500 mg. ascorbic acid. | Large doses of the deficient vitamins are required to reestablish the normal vitamin content of the body. |
| Treatment: 1.5 mg. Riboflavin intravenously; 200 mg/day of nicotinic acid. | Evidence is given that administration of vitamins cures lesions in the oral cavity. |
| Treatment: Thiamine chloride 5 mg./day; nicotinic aicid 50 mg. per day. | Prompt and satisfying results in cases of solitary herpetic lesions. |
| Treatment: 500 mg. per day nicotinic acid (in 10 doses) | It may be necessary to prescribe concurrently, nicotinic acid and riboflavin to clear up symptoms. |
| | Oral signs and symptoms of pellegra discussed. |
| Treatment: Riboflavin 200-500 mg. nicotinamide; 300-500 mg. ascorbic acid. | Large doses of the deficient vitamins are required to reestablish the normal vitamin content of the body. |
| Treatment: Thiamine 9 mg./day; riboflavin 3 mg./day; niacin 75 mg. | Where these vitamins were ineffective, patients may have chronic iron deficiency anemia, and Ferrous Sulphate (.3 g/day) should be prescribed. |
| Treatment: 100-200 mg. nicotinic acid daily until condition improved. | Toxic effects may result from use of nicotinic acid; but this may be controlled by administration of the drug with or after main meals of the day. |
| Treatment: Thiamine 9 mg/day; riboflavin 3 mg/day; niacin 75 mg. | Where these vitamins were ineffective, patients may have chronic iron deficiency anemia and Ferrous Sulphate (.3 g/day) should be prescribed. |
| Treatment: 1.5 mg. riboflavin intravenously; 200 mg./day of nicotinic acid. | Evidence is given that administration of vitamins cures lesions in the oral cavity. |

CONDITIONS ASSOCIATED WITH NIACIN DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS |
|---|---|---|
| Ulceration of buccal and labial mucosa | Littman, M. | |
| Ulcerated and sore mouth | Scott, H. T. | |
| ***Conditions associated with vitamin B-complex deficiencies*** | | |
| Acute necrotizing ulcerative gingivitis (Vincent's Infection) | Gunther, E. | |
| | Kirkpatrick, R. M. | 1976 patients |
| Angular stomatitis | Norman, R. | |
| Aphthous stomatitis, cyclic habitual | Strauss, K. | 40 female humans |
| Atrophy of connective tissues and serious atrophy of bone marrow in mandibular joints and periodontium. | Gorlin, R. J.<br>Levy, B. M. | 55 rats |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: Nicotinic acid. | If no results are obtained in 72 hours administration of vitamin should be discontinued. |
| Treatment: Liver, yeast, lean meats. 15-20 mg. niacin daily for adult male. | Aids integrity of oral tissues. |
| Prevention: Diet rich in vitamin B-complex, vitamin A, vitamin C. | There is no specific drug for cure; importance is stressed of local and systemic predisposing causes (and removal of same – especially local factors). |
| Cause: Deficiency of vitamin A and B associated with Vincent's infection. | Percentage of natives on vitamin A and B deficient diet who presented acute or sub-acute Vincent's was significantly greater than percentage of those on diet containing sufficient vitamins A & B. |
| Prevention: B-complex present in germs of seeds, eggs, yeast, wheat, rice, peas, beans, nuts, vegetables, fruits. | Author stresses need for diet containing high vitamin, mineral foods that are not processed. |
| Treatment: Vitamin B-Complex orally | B-complex given orally every day reduces possibility of recurrence of aphthous stomatitis. |
| 12 rats: stock diet<br>21 rats: vitamin B deficient diet<br>22 rats: vitamin B deficient diet first and then stock diet after 3 weeks. | Refeeding of stock diet resulted in:<br>(1) Rapid resumption of chondrogenesis and osteogenesis.<br>(2) Remodeling of bone.<br>(3) Hyperplasia of fibrous connective tissue.<br>(4) Repair of cementum and dentin by a cementum or bonelike substance. |

CONDITIONS ASSOCIATED WITH VITAMIN B-COMPLEX DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS |
|---|---|---|
| Cheilosis | Norman, R. | |
| Cheilitis | Lerner, H. H. | |
| Chondrogenesis and osteogenesis (diminution) in mandibular joints and periodontium. | Gorlin, R. J.<br>Levy, B. M. | 55 rats |
| Decolorization of incisors | Stein, G.<br>Runne, E.<br>Gross, P. | 75 female rats |
| Dental Caries | Kneisner, A.<br>Mann, A. W.<br>Spies, T. | 51 patients |
| Dry socket | Hill, E. S. | 12 patients |
| Edema of the tongue and redness. | Norman, R. | |
| Erythema multiforme | Moe, T. L. | 7 patients |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Prevention: B-complex present in germs of seeds, eggs, yeast, wheat, rice, peas, beans, nuts, vegetables, fruits. | Chronic deficiency represented by excessive and irregular wrinkling of lips, acute deficiency produces swelling and erosion of lips. |
| Cause: Pyridoxine deficiency<br>Treatment: 50 mg./day | |
| 12 rats: stock diet<br>21 rats: vitamin B deficient diet<br>22 rats: vitamin B deficient diet first, then stock diet after 3 weeks. | Refeeding of stock diet resulted in:<br>(1) Rapid resumption of chondrogenesis and osteogenesis.<br>(2) Remodeling of bone.<br>(3) Hyperplasia of fibrous connective tissue.<br>(4) Repair of cementum and dentin by a cementum or bonelike substance. |
| Cause: Suboptimal panothenic acid diets, plus toxic doses of zinc carbonate. | These changes produced by a pantothenic acid deficiency alone, or by one precipitated by a metal poisoning. |
| Patients with B-complex deficiency. | Forty-one patients with pellagra, beriberi, riboflavin deficiency had low incidence of dental caries and low number of oral lactobacilli. |
| Treatment: 15-30 mg. $B_1$ plus B-complex. | Rationale for use. Thiamine is necessary for nerve integrity. It is proposed that dry socket (post-operative pain) is a form of localized neuritis. |
| Prevention: B-complex present in germs of seeds, eggs, yeast, wheat, rice, peas, beans, nuts, vegetables, fruits. | Symptoms shown by dental indentations. Redness varies according to acuteness of condition. |
| Treatment: ½ grapefruit/day, vitamin B. | |

CONDITIONS ASSOCIATED WITH VITAMIN B-COMPLEX DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS |
|---|---|---|
| Glossitis | Bacchi, J. G. | |
| Glossopyrosis | Miller, S. C.<br>Ross, S.<br>Alderman, N. | 6 women |
| Hyperkeratinizations | Gross, P.<br>Runne, E.<br>Stein, G. | 75 female rats |
| Mandibular joints and periodontal structures, and pantothenic acid deficiency. | Levy, B. M. | 9 mice |
| Oral mucosal changes with pantothenic acid deficiency | Nelson, M. M.<br>Wainwright, W. W. | 226 rats |
| Resorption of cementum and dentin | Gorbin, R. J.<br>Levy, B. M. | 55 rats |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: Large doses vitamin A and B-complex supplement of vitamin C. | Symptoms subsided. |
| Treatment: 15 mcgm $B_{12}$ of crystalline vitamin intramuscularly weekly for 1-2 months. Oral dosage: from 5 micrograms daily to none. | After 3 months all patients displayed a decreased incidence of subjective symptoms (burning tongue); reduction of glossitis. |
| Cause: Suboptimal pantothenic acid diets plus toxic doses of zinc carbonate. | (1) These changes produced by pantothenic acid deficiency alone, or by one precipitated by a metal poisoning.<br>(2) Nature of necrosis resembles Vincent's infection and noma in humans. |
| Cause: Diets deficient in pantothenic acid. | (1) Hypertrophy of growing cartilage of the condyle.<br>(2) Lack of bone formation; containing resorption of alveolar bone; broadening of periodontal membrane.<br>(3) Rate of bone destruction normal; rate of bone production retarded. |
| Cause: Diets deficient in pantothenic acid. | Progressive necrosis of oral epithelium and subsequent destruction of underlying connective tissues with an extraordinary absence of inflammatory response. |
| 12 rats: stock diet<br>21 rats: vitamin B deficient diets<br>22 rats: vitamin B deficient diet first and then stock diet after 3 weeks. | Refeeding of stock diet resulted in:<br>(1) Rapid resumption of chondrogenesis and osteogenesis.<br>(2) Remodeling of bone.<br>(3) Hyperplasia of fibrous connective tissue.<br>(4) Repair of cementum and dentin by a cementum or bonelike substance. |

CONDITIONS ASSOCIATED WITH VITAMIN B-COMPLEX DEFICIENCIES (*continued*)

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUN OF VIT |
|---|---|---|---|
| Suppurative periodontitis | Kirkpatrick, R. M. | 1976 patients | Cause vitam |
| Tic Douloureux | Bacchi, J. G. | 1 patient | Treat B-com daily |
| | Hills, E. S. | 52 patients | Treat |
| Ulcers (mouth) and marked gingival and periodontal necrosis. | Stein, G.<br>Runne, E.<br>Gross, P. | 75 female rats | Caus panto toxic carbo |

## *Conditions associated with vitamin C deficiencies*

| | | | |
|---|---|---|---|
| Bacterial Growth (excess) on teeth and lack of resistance to their presence | Leonard, H. J. | | Caus defic |
| Bleeding gums | Strean, L. P. | 21 patients | Ruti (30 ascor |
| Calculus Deposits (Lithogenesis) | McCormick, W. J. | | Vita quar |
| Caries | Grandison, W. B.<br>Cruickshank, D. B.<br>Scott, L. B. | 20 patients | 200 |

| ALS | AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|---|
| | Cause: Diets deficient in vitamin A and B-complex | A significantly greater percentage of natives on diets deficient in vitamins A and B-complex had suppervative periodontitis than the percentage of natives on a diet sufficient in these factors. |
| | Treatment: A and B-complex plus 50 mg. daily of $B_1$. | To have satisfactory therapeutic value, vitamins should be administered (orally or parenterally) for a long period of time. |
| | Treatment: Vitamin $B_1$ | Injection of thiamine were used. Satisfactory. |
| | Cause: Suboptimal pantothenic acid diets plus toxic doses of zinc carbonate. | (1) These changes produced by pantothenic acid deficiency alone, or by one precipitated by a metal poisoning.<br>(2) Nature of necrosis resembles Vincent's infection and noma in humans. |
| | | |
| | Cause: Vitamin C deficiency. | Other causes of this condition are overeating, vitamin D, A, and thiamine deficiency. |
| | Rutin and ascorbic acid (30 mgm. rutin, 50 mgm. ascorbic acid/day) | Reports that rutin plus ascorbic acid more effective than ascorbic acid alone. |
| | Vitamin C in large quantity in diet. | Vitamin C alters the physio-chemical properties of body fluids especially eliminating deposits of phosphates which reduces calculus. |
| | 200 mg. ascorbic acid/day. | No evidence of decrease in caries incidence. |

CONDITIONS ASSOCIATED WITH VITAMIN C DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT OF VITA |
|---|---|---|---|
| Circulatory disturbances, i.e. – thrombocytopenia, purpura infectrosa, hemophilia, and capillary hemorrhage. | Lilliendahl, J. R. | 32 patients | Vitam intrav |
| Erythema multiforme | Moe, T. L. | 7 patients | ½ gra vitami |
| Gingival Hemorrhage | Mead, S. V. | 131 humans (prison inmates) | ½ gra |
| Gingival swelling | Nelson, F. G.<br>Pecchenino, J. W. | | Vitan |
| Gingival tone, poor | Nelson, F. G.<br>Pecchenino, J. W. | | Vitan |

| ANIMALS | AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|---|
| | Vitamin C orally and intravenously. | (1) Ascorbic acid given to ascorbutic animals results in deposition of intercellular material binding cells of vascular endothelium.<br>(2) Logical to give vitamin C both pre- and post-operatively in cases of history of low vitamin C intake. |
| | ½ grapefruit/day (also vitamin B) | In vitamin B deficiency the estrogen inactivating function of the liver is depressed so that the blood level of estrogen rises and thus causes symptoms of erythema multiforme. |
| | ½ grapefruit/day | (1) Test groups showed increased blood and urine ascorbic acid levels.<br>(2) Improvement of gingival condition and in general health.<br>(3) No deleterious effect upon enamel noted. |
| | Vitamin C | Vitamin C is effective only when the gingival swelling is due specifically to vitamin C deficiency. |
| | Vitamin C | Three methods of restoring lost tone to gingival tissue are discussed: oxygenation, radiation, and vitamin C therapy. |

CONDITIONS ASSOCIATED WITH VITAMIN C DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUN OF VIT |
|---|---|---|---|
| Gingivitis | Blockley, C. H.<br>Baezinger, P. E. | 41 patients | 100 c |
| | Christian, P. | Infants and adults | Cause defici |
| | Gordon, S. M. | *Review of* | *Litera* |
| | Linghorne, W. J. | R.C.A.F. males | 75 m |
| | Orban, B.<br>Martin, W. B.<br>Hehn, R. | 1 human | 100 acid |
| | Ryan, E. J. | 1400 young adults | Vita mgm |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| 100 cc. orange juice daily. | (1) Correlation exists between lowered vitamin C in blood and periodontal conditions.<br>(2) Local treatment must be supplemented with vitamin C (200-500 mgm. ascorbic acid). |
| Cause: Vitamin C deficient diets. | (1) Requirements of vitamin C raised in infectious fevers and other debilitating diseases.<br>(2) Therapeutic dosage 250 mg/day (by mouth or parenterally) ascorbic acid, or 10 oz. orange juice or lemon juice 3 times/day.<br>(3) Ascorbic Acid aids healing<br>pre-op. – 150 mg./day (2 days)<br>post-op. – 200-500 mg./day (3 days)<br>after extractions 200-300 mg./day (5 days)<br>100-150 mg./day (next 6 days) |
| *Literature* | Gingivitis and involvement of supporting structures is associated with low vitamin C. |
| 75 mgm. vitamin C daily | (1) Large amounts of vitamin A, D, B, nicotinic acid and ascorbic acid had no effect on existing gingivitis.<br>(2) When gingivitis cleared up clinically provision of 75 mgm. of vitamin C daily had delaying action on recurrence. |
| 100 mgm/day of ascorbic acid | Clinical and histo-pothological signs and symptoms of ascorbutic gingivitis presented. Prescribing vitamin C effective. |
| Vitamin C orally 75 mgm/daily | Local treatment should be accompanied by dietetic treatment, otherwise percentage of recurrence is high. |

CONDITIONS ASSOCIATED WITH VITAMIN C DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT OF VITA |
|---|---|---|---|
| Glossitis | Bacchi, J. G. | | Treatn vitami supple |
| Healing | Campbell, H. G.<br>Cook, R. P. | 4 patients | 500 m orally |
| Hypovitaminosis C | Boyle, P. E. | Guinea pigs and 6 children (post mortem) | Diets c |
| Necrotizing ulcerative gingivitis, acute | Gunther, E. | | Treatn B-com |
| | Kirkpatrick, R. M. | 12 patients | Prever C-8 oz vitami |
| | Lapira, E. | 120 patients | Treatn C, 3 d |
| | Walsh, G. E. K. | 72 patients | Treatn 300 m mg/lit |
| Paradontosis | Reider, B. B. | | Vitam |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: Large doses vitamin A and B complex; supplement of vitamin C. | To have satisfactory therapeutic value, vitamins should be administered (orally or parenterally) for a long period of time. |
| 500 mgm. vitamin C/day orally | (1) Ascorbic acid plays important role in healing wound of gingiva and in absorption of alveolar bone margins.<br>(2) Pain and bleeding minimized. |
| Diets deficient in vitamin C | (1) Lack of vitamin C causes rupture of periodontal membrane.<br>(2) Changes in guinea pigs and children with regard to alveolar bone and periodontal membrane are the same.<br>(3) Limited studies indicate vitamin C deficiency frequent cause of systemic periodontal condition in humans. |
| Treatment: vitamin A, B-complex, C. | There is no specific drug for cure; importance is stressed of local and systemic predisposing causes (and removal of same – especially local factors). |
| Prevention: Daily vitamin C-8 oz. orange juice and vitamin $B_2$-2 drachms. | 2 drachms of yeast extract or 8 oz. orange juice a day maintains health of gingivia. |
| Treatment: 25 mg. vitamin C, 3 doses per day. | Vitamin C and improved diet brought tissues to normal by increasing the resistance to disease. |
| Treatment: Vitamin C 300 mg/day until 100 mg/litre or more in urine. | The incidence of the disease bears no direct relation to maximum vitamin C deficiency. |
| Vitamin C | Vitamin C administration in many cases will favor healing of diseased tissues. |

CONDITIONS ASSOCIATED WITH VITAMIN C DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT OF VITA |
|---|---|---|---|
| Periodontal Disease (and gingivitis) | Burrill, D. Y. | | Relatio low bl periodo |
| Periodontal Disease | Fitzsimmons, L. J. | 50 patients | Vitami |
| | Ogawa, R. | | |
| Periodontal Disease | Radusch, D. F. | | Vitami fruit ju juice. |
| Periodontal pockets | Sinclair, J. A. | | Vitami |
| Rarefaction of alveolar bone (and loss of tooth attachments) | Kerr, D. A. | | Vitami |
| Redness (edema) of gingiva | Norman, N. L. | | Vitami vegetab fresh fr |

| MALS | AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|---|
| | Relationship between low blood vitamin C and periodontal disease. | (1) Cases of gingivitis-low blood vitamin C.<br>(2) Cases of periodontal disease-low blood vitamin C.<br>(3) In each group, amount of variations too small to be significant. |
| | Vitamin C | (1) Acid ash diet contains little vitamin C.<br>(2) For more satisfactory healing of periodontal conditions, vitamin C should be increased to optimum value. |
| | | (1) Compared symptoms of periodontal disease and vitamin C deficiency.<br>(2) Vitamin C essential for maintenance of general health of body tissues.<br>(3) Deficiency results in oral manifestations of gingivitis, diffuse alveolar atrophy, etc. |
| | Vitamin C in 3 oz. of citrus fruit juice or 6 oz. tomato juice. | (1) Blood ascorbic acid level maintained within desired range for limited diets.<br>(2) "Partial" vitamin C deficiency may be factor in periodontal disease. |
| | Vitamin C | Treatment includes administration of vitamin C and local application of eugenol paste in pockets for few days. |
| | Vitamin C | (1) Deficiency is manifested in intercellular substance and capillary wall.<br>(2) Affects bones in children; appears in gums in adults. |
| | Vitamin C present in fresh vegetables (green) and fresh fruits. | Increased use of vitamin C foods improved gingival tone. |

## *Conditions associated with vitamin D deficiencies*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS |
|---|---|---|
| Bacterial growth (excess) on teeth, and lack of resistance to their presence. | Leonard, H. J. | |
| Growth and mineralization (abnormal) of children's teeth. | Scott, H. T. | |
| Hypervitaminosis D | Becks, H.<br>Axelrod, H. E.<br>Collins, D. | 12 young dogs |
| | Becks, H. | 4 dogs |
| | Becks, H.<br>Freytig, R. M. | Dogs |
| | Ziskin, D. E.<br>Gibson, J. A.<br>Skarka<br>Bellows | 8 humans<br>32 rats |
| | Sweet, C. A. | Dogs<br>Cats |
| | Ziskin, D. E. | 17 humans |
| Hypovitaminosis D | Boyle, P. E. | Guinea pigs |
| Salivary calcium and phosphorous (effects of vitamin D on) | Morris, M. C.<br>Krishkowy, E. S.<br>Weinberg, I. G. | 10 humans |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Cause: Vitamin D deficiency | Other causes of this condition are over-eating vitamin A, C, and thiamine deficiencies. |
| Prevention: 400 units daily; children (under 1 year) and pregnant women; 400-800 units daily. Sources: fish liver oils, vitamin D, milk, etc. | The requirement of vitamin D is that which insures sufficient retention of calcium and phosphorous. Vitamin D acts by increasing the amounts of these substances available for mineralization of bones and teeth. Foods are practically devoid of vitamin D. Hence, vitamin D-enriched foods or pharmaceuticals must be resorted to. |
| Cause: A massive dose of 450,000 I.U. of vitamin $D_2$. | (1) Osteoporosis of mandible occurred.<br>(2) Deformation of teeth occurred. |
| Cause: Overdosage of vitamin D. | (1) Retardation of growth of jaws and teeth occurred.<br>(2) Malformations also occurred. |
| Cause: Chronic overdose of vitamin D. | Pathologic changes around roots and in bone occurred. |
| Dosage: 300,000 units of vitamin D for humans; 60,000 USP units/kgm. body weight for rats. | (1) No toxicity noted.<br>(2) No alteration in rate of tooth eruption or in skeletal calcification. |
| Cause: Overdose of vitamin D. | Review of literature: formation of pulp stones; calculus; osteosclerosis of jaw bone. |
| Dosage: 150,000-300,000 USP units ertron. | Oral improvements, such as: more mature keratin, increase of fibroblasts, etc. |
| Cause: Vitamin D deficient diets. | Typical rickets in guinea pigs, with defective calcification of bones. |
| Cause: 4 cc. of irradiated ergosterol; 6000 USP units of vitamin D. | Calcium level showed reduction. Phosphorous trend less well defined. |

## *Conditions associated with vitamin K deficiencies*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUN OF VIT |
|---|---|---|---|
| Caries | Russman, S. K. | | Treatı 1 mg/ |
| | Ryan, E. J. | | Vitam gum. |
| Hemorrhage | Russman, S. K. | | Treatı 1 mg/ |
| | Sullivan, D. J. | | |
| | Thoma, K. H. | | |
| | Wells, C. R. | | Treatı min K |
| Hypovitaminosis K | Dam, H.<br>Granados, H. | 18 rats | (1) V d<br>(2) V d |
| Prolonged ingestion of vitamin K | Hatton, E. H.<br>Fosdick, C. S.<br>Dodds, A.<br>Hodge, H. C. | 40 rats | Synthe |
| Synthetic vitamin K and rate of acid formation in saliva. | Fosdick, C. S.<br>Calandra, J. C.<br>Foncher, O. E. | | Saliva min K pound |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Treatment: Vitamin K 1 mg/day intravenously | 60%-90% reduction in caries rate. |
| Vitamin K in chewing gum. | Caries incidence reduced. |
| Treatment: Vitamin K 1 mg/day intravenously | Improvement of gingival conditions where bleeding is due to low prothrombin. |
| | Where prothrombin level is below 50% of normal, vitamin K is administered by injection or orally with bile salts. Give pre-operatively for 3 days; also post-operatively. |
| | (1) Discusses action, storage, production, and causes of avitaminosis K.<br>(2) Therapeutic dose – natural vitamin K 2-4 mg/day 2 days before and 7 days after operation. |
| Treatment: 6 mgs. vitamin K every 6 hours. | This dosage will produce improvement in conditions causing hemorrhage due to K deficiency. |
| (1) Vitamin K deficient diets.<br>(2) Vitamin K deficient diets plus sulfadiazine. | (1) Striking growth deficiency.<br>(2) Decline of eruption and attrition rate of teeth in vitamin K deficient animals. |
| Synthetic vitamin K | (1) No growth rate changes were evidenced.<br>(2) No difference in caries incidence. |
| Saliva plus synthetic vitamin K and related compounds. | Acid production inhibited by the quinones and their derivatives, and the peroxides. |

## *Conditions associated with miscellaneous deficiencies*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | AMOUNT OF VITA |
|---|---|---|---|
| Bleeding tendency | Cahn, L. | | Cause: acid (a |
| Decalcification and improper skeletal development | Light, R. F.<br>Smith, C. A. H. | 3 dogs | Cause: diets. |
| Degeneration of connective tissue of gingival and periodontal membrane. | Chawla, T. N.<br>Glickman, I. | 80 albino rats | Cause: diets (2 control |
| Degeneration of enamel epithelium | Becks, H.<br>Furuta, W. J. | 14 rats | Cause: deficien |
| Delayed healing of wounds. | Harding, R. L. | | Cause: intake drop in |
| Depigmentation of incisors | Dam, H.<br>Granados, H. | Albino rats | Cause: vitamin |
| | Pindborg, J. J. | 39 rats | Cause: vitamin |
| Hemorrhagic tendency | Journal Ortho. and Oral Surg. (Editorial) | | |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Cause: Acetylsalicylic acid (aspirin) | Aspirin has dicumeral-like action therefore; Treatment: 1 mg. vitamin K/5 gm. aspirin will prevent bleeding tendency of aspirin alone. |
| Cause: Low-calcium diets. | (1) Acute calcium deficiency may produce drastic effects on skeletal structure, yet have little effect on teeth and alveolar process.<br>(2) Slight hypoplasia of enamel and dentin may result. |
| Cause: Protein deficient diets (2% protein); also controls (22% protein) | (2) Femur and vertebrae: osteoporosis and marked inhibition of endochondral and periosteal bone formation.<br>(1) Similar changes occur in other areas of skeletal system, in addition to periodontal tissues. |
| Cause: Magnesium deficient diet | |
| Cause: Lowered protein intake (and consequent drop in serum protein) | (1) 25% reduction in serum protein causes complete failure of healing.<br>(2) High protein intake produces elimination or shortening of latent period of healing (about 4 days).<br>(3) Maxillo-facial patients: give whole blood and plasma, and high protein intake for 2 weeks (reduce gradually to normal in 4-6 weeks). |
| Cause: Deficiency of vitamin E. | 0.02% vitamin E protects against enamel depigmentation. |
| Cause: Diets deficient in vitamin E. | Histopathologic changes observed in enamel organ. |
| | Abnormal capillary permeability resolved by administration of vitamin P; effective even when vitamin C failed. |

CONDITIONS ASSOCIATED WITH MISCELLANEOUS DEFICIENCIES *(continued)*

| CONDITIONS | AUTHOR | NUMBER OF ANIMALS OR PATIENTS | MOUNT A F VITAMI |
|---|---|---|---|
| Osteoporosis of alveolar bone. | Chawla, T. N.<br>Glickman, I. | 80 albino rats | Cause:<br>liets (2<br>ontrols |
| Perleche and/or tongue lesions. | Kerr, D. A. | | Treatme |
| Retardation of cementum deposition | Chawla, T. N.<br>Glickman, I. | 80 albino rats | Cause:<br>liets (2<br>ontrols |
| Sprue | Kerr, D. A. | | Treatme<br>folic a |

| AMOUNT AND TYPE OF VITAMIN | SUMMARY |
|---|---|
| Cause: Protein deficient diets (2% protein) and controls (22% protein) | (1) Femur and vertebrae: osteoporosis and marked inhibition of endochondral and periosteal bone formation.<br>(2) Similar changes occur in other areas of skeletal system in addition to periodontal tissues. |
| Treatment: Ferrous sulfate | Where vitamin intake adequate – ferrous sulfate cleared up lesions. |
| Cause: Protein deficient diets (2% protein) and controls (22% protein) | (1) We find in femur and vertebrae: osteoporosis and marked inhibition of endochondral and periosteal bone formation.<br>(2) Similar changes occur in other areas of skeletal system in addition to periodontal tissues. |
| Treatment: Vitamin M (folic acid) | Vitamin M corrects faulty intestinal absorption. |

## Bibliography


1. Aldersberg, D.: Vitamin problems in oral pathology, *New York J.D.* 13:181-189, April 1947.

2. Alexander, E.: Caries frequency and nutrition before, during, and after World War II, *Acta Odon. Scandina.*, 8:269-300, April 1950.

3. Allison, I.: Trace elements and their importance to man, *J. Missouri D.A.*, 29:119-123, April 1949.

4. Fat soluble vitamins (Ed.) *Am. J. Orthodont. & Oral Surg.* 27: Sec. *Oral Surg.*: 341-342, June 1941.

5. Vitamin P (Ed.) *Am. J. Orthodont. & Oral Surg.* 29: Sec. *Oral Surg.*: 239-240, April 1943.

6. Armstrong, W. D.: Evaluation of the role of vitamins and minerals in the control of caries, *J.D. Res.*, 27:376-396, June 1948.

7. Bacchi, J. G.: Leucoplakia treated with vitamins A and B, *D. Survey*, 22:1306-1307, July 1946.

8. Bacchi, J. G.: Therapeutic value of vitamins in the treatment of diseases of the oral cavity, *D. Items Interest*, 71:570-571, June 1949.

9. Batten, R. F. and Taves, M.: Vitamin K and its effect on dental caries, *Contact Point*, 26:39-43, Nov. 1947.

10. Becks, H.: Effects of a Vit. D overdosage in dental and paradental structures, *J.A.D.A.*, 29:1947-1968, Nov. 1942.

11. Becks, H.: Collins, D. A., Axelrod, H. E. Effects of a single massive dose of vitamin $D_2$ (D-Stoss Therapy) on oral and other tissues of young dogs, *Am. J. Orthodont.*, 32:352-462, Aug. 1946.

12. Becks, H., Freytig, R. M.: Changes in oral structures of the dog persisting after chronic overdoses of Vit. D, *Am. J. Orthodont.*, 32:463-471, Sept. 1946.

13. Bell, M. E.: Whole meal versus white bread, *New Zealand D.J.*, 42:5-9, Jan. 1946.

14. Blau, A. I.: Body defense, *J. Second Dist. D. Soc. (N.Y.)*, 27:214-216, Feb. 1942.

15. Blevins, C. C.: Scorbutic stomatitis, *J. Baltimore Col. D. Surg.*, 9:28-31, Sept. 1945.

16. Blockley, C. H. and Baezinger, P. E.: Investigation into the connection between the vitamin C content of the blood and periodontal disturbances, *Brit. D.J.*, 73:57-62, Aug. 1942.

17. Blumenfield, M. and Berman, W.: Nicotinic Acid as a therapeutic agent in the treatment of Vincent's infection, *Columbia D. Rev.*, 14:3-9, Sept. 1942.

18. Boyle, P. E.: Effect of various dietary deficiencies on the periodontal tissues of the guinea pig and of man, *J.A.D.A.*, 28:1788-1793, Nov. 1941.

19. Boyle, P. E.: Gingival disease, *Massachusetts D. Soc. Bul.*, 17:9213, Jan. 1941.

20. Boyle, P. E.: Effects of vitamin A deficiency on periodontal tissues, *Am. J. Orthodont.*, 33: Sec. *Oral Surg.*, 744-748 Oct. 1947.

21. Boyle, P. E.: Teeth, guinea pigs and dentistry, *New York J. Den.*, 16:339-344, Nov. 1946.

22. Burket, L. W. and Hickman, G. C.: Oral Herpes (simplex) manifestations, treatment with vitamin B complex, *J.A.D.A.*, 29:411-418, Mar. 1942.

23. Burrill, D. Y.: Oral conditions in experimental vitamin C and B deficiency, *J.A.D.A.*, 22:594-600, May 1946.

24. Burrill, D. Y.: Relationship of blood plasma vitamin C level to gingival and periodontal disease, *J.D. Res.*, 21:353-363, Aug. 1942.

25. Burrill, D. Y., Calandra, J. C., Tilden, E. B. and Fosdick, C. S.: Effect of 2-methyl-1,4 napthoquinone on the incidence of dental caries, *J.D. Res.*, 24:273-282, Dec. 1945.

26. Butt, H. R.: Practical use of vitamins in medical and dental practice, *J. Canad. D.A.*, 7:383-389, Aug. 1941.

27. Campbell, H. G. and Cook, R. P.: Use of ascorbic acid (vit. C) in the treatment of tooth extraction wounds, *Brit. D.J.*, 72:6-9, Jan. 1, 1942.

28. Cahn, L.: Notes on oral medicine, *Ann. Den.*, 6:174-185, Sept. 1947.

29. Chawla, T. H. and Glickman, I.: Protein deprivation and the periodontal structures of the albino rat, *Oral Surg., Oral Med., and Oral Path.*, 4:578-602, May 1951.

30. Chilton, N. W.: Nutritional aspects of periodontal therapeutics, *J.A.D.A.*, 43:583-592, Nov. 1951.

31. Christian, P.: Vitamin C (ascorbic acid), *J. Nair Hospital D. Coll.*, 2:35-41, 1950-1951.

32. Christensen, Geo.: Two cases of facial neuralgia treated with vitamin $B_1$, *D. Items Interest*, 64:317-319, April 1942.

33. Cornish, E.: Dental-medical role of vitamin $B_{12}$, *J. D. Med.*, 6:63-68, April 1951.

34. *D. Gaz.*: The vitamin B Complex (Ed.), 7:207, Feb. 1941.

35. Dinnerman, M.: Vitamin A deficiency in unerupted teeth of infants, *Oral Surg., Oral Med., and Oral Path.*, 4:1024-1038, Aug. 1951.

36. Dreizen, S., Greene, H. I., and Spies, T. D.: Utilization of cereals in various stages of refinement by an oral strain of L. acidophilus, *J.D. Res.*, 29:307-314, June 1950.

37. Emmons, R. O.: Effect of vitamin K on post-extraction bleeding, *Northwest Univ. Bull.*, 47:16-17, Mar. 1947.

38. Fitzsimmons, L. J.: Vitamin C deficiency, a cause of periodontal disease, *J.A.D.A.*, 28:76-80, Jan. 1941.

39. Foncher, O. E., Calandra, J. C. and Fosdick, L. S.: Effect of vitamins on acid formation in saliva, *J.D. Res.*, 23:23-29, Feb. 1944.

40. Foncher, J. K.: Calcium metabolism from the skeletal standpoint, *J. Georgia D.A.*, 15:5-11, Aug. 1941.

41. Fosdick, L. S., Calandra, J. C., Foncher, O. E.: Effect of synthetic vitamin K and related compounds on the rate of acid formation in saliva, *J.D. Res.*, 23:31-37, Feb. 1944.

42. Fosdick, L. S.: Degradation of sugars in the mouth and the use of chewing gum and vitamin K in the control of dental caries, *J.D. Res.*, 27:235-240, April 1948.

43. Gersohn, W. E.: Rates on relation between diet and oral disease in natives of Southern Rhodesia, *J.D.D.S. Africa*, 2:12-14, Jan. 1947.

44. Gibson, J. A., Skarka, Bellows, Ziskin: Effect of large daily doses of vitamin D on teeth and jaws of rats and on humans, *J.D. Research*, 22:457-468, Dec. 1943.

45. Glickman, I.: Acute vitamin C deficiency and periodontal disease, *J.D. Res.*, 27:9-23, Feb. 1948.

46. Glickman, I.: Acute vitamin C deficiency and the periodontal tissues, II. The effect of acute vitamin C deficiency upon the response of the periodontal tissues of the guinea pigs to artificially induced inflammation, *J.D. Res.*, 27:201-210, April 1948.

47. Goldman, H. M.: Report of a histopathologic study of the jaws of a diet deficient monkey and its relation to Vincent's infection, *Am. J. Ortho. & Oral Surg.*, 29: Sec. Oral Surg., 480-488, Sept. 1943.

48. Goodhart, R. S.: Nutrition and the oral mechanism, *J.D. Med.*, 6:60-62, April 1951.

49. Gordon, S. M.: Gingivitis and ascorbic acid, *Alpha Omegan* 8-10, June 1946.

50. Gorlin, R. J. and Levy, B. M.: Changes in the mandibular joint and periodontium of vitamin B-complex deficient rats and the cause of repair, *J.D. Res.*, 30:515-516, Aug. 1951.

51. Granados, A. and Dam, H.: Influence on the rat incisor of vitamin D deficiency in the presence of sulfadiazine containing diets, *J.D. Res.*, 24:137-139, June-Aug. 1945.

52. Grandison, W. B., Cruickshank, D. B., Stott, L. B.: Investigation into the influence of synthetic vitamin C as a controlling factor in the incidence of dental caries in already calcified teeth, *Brit. D.J.*, 72:237-239, May 1, 1942.

53. Greene, H. I., et. al.: Clinical survey of the incidence of impaired masticatory function in patients of a nutrition clinic, *J.A.D.A.*, 39:561-571, Nov. 1949.

54. Gunther, Edgar: Vincent's infection, the bacteriology, dietary management and treatment, *D. Bull. Suppl. Army Med. Bull.*, 12:72-80, April 1941.

55. Hatton, E. H., Dodds, A., Hodge, H. C., Fosdick, C. S.: Effect

of prolonged ingestion of synthetic vitamin K in rats, *J.D. Res.*, 24:283-295, Dec. 1945.

56. Hicks, H.: Excessive citrus juice consumption; clinical observations of its effect on superficial and deep tissues of the oral cavity, *Oral Surg., Oral Med., and Oral Path.*, 4:858-870, July 1951.

57. Hill, E. S.: Importance of the vitamin B complex in oral health, *Wash. Univ. D.J.*, 9:77-87, May 1943.

58. Hirschi, R. G.: Post-extraction healing in vitamin A deficiency hamsters, *J. Oral Surg.*, 8:3-11, Jan. 1950.

59. Irving, J. T.: Effect of simultaneous vitamin A and vitamin D deficiency upon the dentine of the incisor teeth of the rat, *D. Record*, 63:281-284, Dec. 1943.

60. Irving, J. T.: Effects of avitaminosis and hypervitaminosis upon the incisor teeth and incisal alveolar bone of rats, *Jour. of Physiol.*, 108:92-101, 1949.

61. Jour. South Calif. D.A.: Vitamin A (editorial) 8:6-7, Nov. 1941.

62. Keach, F. P.: Oral manifestations of vitamin B complex deficiency, *Tufts D. Outlook*, 19:17-20, June 1945.

63. Kerr, D. A.: Nutritional deficiencies and vitamin M, *J. Mich. D.A.*, 29:190-191, Oct. 1947.

64. King, J. D.: Abnormalities in the gingival and sub-gingival tissues due to diets deficiency in vitamin A and carotene, *Brit. D.J.*, 68:349-360, May 1, 1940.

65. Kirch, E. R.: Vitamins, *Fort. Rev. Chicago D. Soc.*, 3:24-29, March 1, 1942.

66. Kirkpatrick, R. M.: Diet: predisposing factor in the aetology of Vincent's infection and periodontitis, *D.J. Australia*, 11:1-6, Jan. 1939, 78-87 Feb. 1939.

67. Kniesner, A., Mann, A. W., Spies, T.: Relationship of dental caries of deficiencies of vitamin B group.

68. Lapira, E.: Ulcerative stomatitis associated with avitaminosis in Malta, *Brit. D.J.*, 74:257-260, May 21, 1943.

69. Larsen, Nils P.: Tooth decay in relation to diet and general health, *J.A.M.A.*, 127-832-838, July 1948.

70. Levy, B. M.: Effect of riboflavin deficiency on the growth of the mandibular condyle of mice, *Oral Surg., Oral Med., Oral Path.*, 2:89-96, Jan. 1949.

71. Levy, B. M.: Effect of pantothenic acid deficiency on the mandibular joints and periodontal structures of mice, *J.A.D.A.*, 38:215-223, Feb. 1949.

72. Lilliendahl, J. R. Jr.: Vitamin C in its relation to capillary hemorrhage and wound healing, *Penn. D.J.*, 43:43-46, Feb. 1941

73. Linghorne, W.J., et. al.: Relation of ascorbic acid intake to gingivitis, *J. Canada D.A.*, 12:49-66, Feb. 1946.

74. Littman, M.: Relationship of nictonic acid to the oral cavity, *Penn. D.J.*, 48:15,31, Feb.-April 1945.

75. Livermore, A. R.: Vitamins and minerals in the prevention of caries, Report of two years experiment with 84 children, *D. Survey*, 18:1169-1174, Sept. 1942.

76. Lund, A. P. and Armstrong, W. D.: Effect of a low calcium vitamin D free diet on the skeleton and teeth of the adult rat, *J.D. Res.*, 21:513-518, Dec. 1942.

77. Massler, M.: Physiology of the oral tissues in health and disease, *J. Calif. D.A.*, 22:1-6, Feb. 1946.

78. McBeath, E. C., Virlin, W. A.: Further studies on the role of vitamin D in the nutritional control of dental caries in children, *J.A.D.A.*, 29:1393-1397, Aug. 1942.

79. McCormick, W. J.: Lithogenesis and hypervitaminosis, *J. Canad. D.A.*, 12:342-346, Aug. 1946.

80. McCoy, C. M.: Nutritional factors in the maintenance of bones and teeth, *N.Y.D.J.*, 17:429-435, Nov. 1951.

81. Mead, S. V.: Studies of the effect of the ingestion of citrus fruit on gingival hemorrhage, *J.D. Res.*, 23:73-79, Feb. 1944.

82. Mellanby, H.: The effect of maternal dietary deficiency of vitamin A on dental tissues in rats, *J.D. Res.*, 20:89-509, Oct. 1941.

83. Miller, S. C., Ross, S. and Alderman, N.: Role of vitamin $B_{12}$ in the treatment of glossopyrosis; a preliminary report, *J.D. Res.*, 30:515-516, Aug. 1951.

84. Mitchell, D. F.: Production of periodontal disease in the hamster as related to diet, coprophage, and maintenance, *J.D. Res.*, 29:732-739, Dec. 1950.

85. Moe, T. L.: Vitamin B therapy in erythema multiforme, *Oral Surg., Oral Med., Oral Path.*, 1:485-487, May 1948.

86. Morris, M. L., Weinberg, I. G., Krishkowy, E. S.: A study of the effects of vitamin D on salivary calcium and phosphorous, *Col. D. Rev.*, 13:3-7, Nov. 1941.

87. Newman, P.: A Unit in mouth healing teaching for home economics (food classes), *J. Amer. D. Hygienists' A.*, 13:6-11, July 1939.

88. Norman, N. L.: Importance of vitamins and minerals in our diet, *J. Louisiana B. Soc.*, 8:3-7, Spring 1951, 9:3-5, Summer 1951.

89. Nutrition Review: Effects of diet during tooth development, *Nutrition Reviews*, 8:37-41, Feb. 1950.

90. Ogawa, R.: Possible relation of vitamin C deficiency to pyorrhea alveolaris, *Wash. Univ. D.J.*, 6:1-5, Aug. 1938.

91. Orban, B., Martin, W. B., Hahn, R.: Histopathologic investigation of a case of ascorvutic gingivitis, *J. Periodont.*, 18:95-100, July 1947.

92. Ostrander, F. D.: Vitamins, sulfonamides and antibiotics in periodontal therapy, *J.A.D.A.*, 37:279-288, Sept. 1948.

93. Pindborg, J. J.: Dental changes in rats on a purified diet deficient in vitamin E, *J.D. Res.*, 29:212-219, April 1950.

94. Pottenger, F. M. and Simonsen, D. G.: The influence of heat labile factors on nutrition in oral development and health, *J. South. Calif. D.A.*, 6:347-350, Nov. 1939.

95. Poyta, S. B.: Role of vitamin D in dental caries, *J. Second Dist. Dent. Soc. (N.Y.)*, 29:368-372, Dec. 1943.

96. Priestly, H.: Synthetic vitamins, their history and use with special reference to wartime conditions, *D.J. Australia*, 15:421-428, Oct. 1943.

97. Radusch, D. F.: Nutrition and Dental Health: Vitamin C, *J. Periodont.*, 17:27-33, Jan. 1946.

98. Radusch, D. F.: Diet as related to periodontal conditions, *J.A.D.A.*, 26:1325-1332, Aug. 1939.

99. Radusch, D. F.: The relationship between periodontal condition and certain dietary factors, *J.D. Res.*, 18:305-327, Aug. 1939.

100. Radusch, D. F.: Human fitness and the state of vitamin nutrition, *J. Periodont.*, 18:169-171, Oct. 1947.

101. Radusch, D. F.: Critical analysis of Dr. H. Becks prize winning article titled "Dangerous effects of vitamin D overdosage on dental and paradental structures," *Minneap. Dist. D.J.*, 27:113-115, March 1943.

102. Radusch, D. F.: Nutrition and dental health Vitamins: Supplementation and Therapeutics, *J. Periodont.*, 17:66-73, April 1946.

103. Radusch, D. F.: Vitamin C therapy in periodontal disease, *J.A.D.A.*, 29:1652-1660, Sept. 1942.

104. Radusch, D. F.: Dietary control in periodontal disease, *Fort. Rev. Chicago D. Soc.*, 21:13-16, Jan. 2, 11-15 Feb. 1, 1951.

105. Radusch, D. F.: Periodontitis and diet control, *J. Canad. D.A.*, 17:378-384, July 1951.

105*a*. Radusch, D. F.: Nutrition and Dental Health, *J. Periodont.*, 16:136, Oct. 1945.

106. Reider, B. B.: Vitamin C deficiency and paradontosis, *Penn. D.J.*, 46:7-8, Oct. 1943.

107. Ribble, R. D.: Riboflavin deficiency and oral lesions, *N.Y.J. Den.*, 10:71, Feb. 1940.

108. Robins, S.: Pellagra: A deficiency disease, *Temple Dental Review Gaz.*, 12:9-10, Mar. 1942.

109. Roth, H.: Ulceration following procaine injections as a possible symptom of avitaminosis B, *D. Items of Interest*, 65:551-553, June 1943.

110. Roth, H.: Vitamins as an adjunct in the treatment of periodontal disease, *J.A.D.A.*, 32:60-66, Jan. 1945.

111. Roth, H.: Arrest of gingival hemorhage by dietary alteration: A preliminary report, *N.Y. State D. J.*, 16:246-251, May 1950.

112. Rudman, P.: Vitamin deficiency diseases, *Dent. Outlook,* 31:100-102, Mar. 1944.

113. Russman, S. K.: Vitamin K: Its relationship to dental conditions, *J. Den. Child.,* 13:99-103, 4th Quart. 1946.

114. Ryan, E. J.: Relationship between ascorbic acid intake and gingivitis, *D. Digest,* 52:269, May 1946.

115. Ryan, E. J.: Vitamin K in chewing gum, *D. Digest,* 52:218-222, April 1946.

116. Schour, I.: Vitamin D and calcium and phosphorous compounds in dental therapy, *Fort. Rev. Chicago D. Soc.,* 3:10, Feb. 1942.

117. Schueuller, C. F.: The effect of nicotinic acid on Vincent's Stomatitis, *D. Bull. Suppl. Army Med. Bull.,* 12:64-69, April 1941.

118. Scott, H. T.: Dentists' role in applying present-day knowledge of nutrition, *J. Wisconsin D. Soc.,* 20:111-125, July-Aug., 1944.

119. Simmonds, N.: Nutritional Correction as an aid in overcoming growth defects in the oral structures, *Amer. J. Ortho. and Oral Surg.,* 25:115-123, Feb. 1939.

120. Sinclair, J. A.: Vitamin A and B deficiency – an etiologic factor in acute, subacute and chronic Vincent's infection and other dental conditions, *J.A.D.A.,* 26:1611-1618, Oct. 1939.

121. Smith, C. A. and Light, R. F.: Low calcium diet: dental effects, *J.D. Res.,* 24:53-553, Feb. 1945.

122. Solloway, R. L.: Ariboflavinosis, *J.D. Soc. N.Y.,* 9:63-67, May-June 1943.

123. Spence, J. C.: Nutrition and disease, *British D.J.,* 67:329-335, 335-340, Oct. 1939.

124. Stein, G.; Gross, P. and Runne, E.: Oral gingival and periodontal pathology induced in rats on a low pantothenic acid diet by toxic doses of zinc carbonate, *Amer. J. Ortho. and Oral Surg.,* 33 Sec. Oral Surg. 407-446, June 1947.

125. Storm, L. B.: Normal nutrition and some relationships to development of good teeth, *J. Michigan D. Soc.,* 21:79-80, April 1939.

126. Strauss, K.: Vitamin $B_1$ therapy in cyclic habitual aphthous stomatitis in women, *Brit. D.J.,* 83:77-80, Aug. 1947.

127. Strean, L. P.: Use of rutin and vitamin C in the treatment of bleeding gums due to increased capillary fragility, *D. Items of Interest,* 70:153-155, Feb. 1948.

128. Street, R. T. and Street, J. B. Jr.: Dentist gets a new vitamin-vitamin P, *Frater,* 48:8-9, Jan. 1950.

129. Sukin, Leon: Correlation of the endocrines and vitamins in periodontal disease, *J.D. Med.,* 3:10-7, Jan. 1948.

130. Sullivan, D. J.: A brief consideration of the anti-hemorrhagic vitamin, *Apollonian,* 16:124-131, July 1941.

131. Sweet, C. A. Sr.: Toxic effects of vitamin D, *Contact Point,* 24:210-215, Mar. 1946.

132. Tavenner, R. W. H.: Vitamin C deficiency and the Potato, *D.J.*, 70:398-400, June 1941.

133. Thoma, K. H.: Vitamin K (Editorial), *Am. J. Ortho. and Oral Surg.*, 27: Sec. Oral Surg., 596-597, Oct. 1941.

134. Thomson, D. C.: Biochemistry in relation to dentistry, *J. Canad. D.A.*, 10:157-161, April 1944.

135. Torrens, R. G.: Dental medicine: proteins and serum colloids in relation to dental disease, *D. Record*, 68:54-59, March 1948.

136. Wainright, N. W.: Comparative histopathological changes in experimental deficiencies of various vitamins B components, *Am. J. Ortho. & Oral Surg.*, 33: Sec. Oral Surg. 740-743, Oct. 1947.

137. Wainwright, N. W., Nelson, M. M.: Changes in the oral mucosa accompanying acute pantothenic acid deficiency in young rats, *Am. J. Ortho and Oral Surg.*, 31: Sec. Oral Surg. 406-421, July 1945.

138. Walker, R. O.: The use of nicotinic acid in the treatment of lesions of the oral mucous membrane, *Dent. Gaz.*, 8:97, Nov. 1941.

139. Walsh, G. E. K.: Vitamin C levels in a P.O.W. camp, *Brit. D.J.*, 79:208-210, Oct. 19, 1945.

140. Walsh, M. J.: Physiologic action and biologic effects of the vitamin B fractions, *Amer. J. Ortho. and Oral Surg.*, 31: Oral Surg. 428, July 1945.

141. Weisberger, D.: Lesions of the oral mucosa treated with specific vitamins, *Am. J. Ortho. & Oral Surg.*, 27: Sec. Oral Surg., 125-127, Mar. 1941.

142. Wilkie, A. C.: Aetiology of Vincent's gingivitis, *Brit. Dent. Jour.*, 78:65-72, Feb. 1945, also *D. Items Interest*, 68:3-4, Jan. 1946.

143. Woodhill, J. M.: Nutritional requirements with special reference to the functioning of the teeth, *D.J. Australia*, 18:1-7, Jan. 1946.

144. Ziskin, D. E.: Effects of large doses of a vitamin D preparation on the oral mucous membrane of human beings, *Am. Jour. Ortho & Oral Surg.*, 32: Sec. Oral Surg. 280-289, June 1946.

145. Ziskin, Rosenstein, Drucker: Interrelation of large parenteral doses of estrogen and vitamin A and their effect of the oral mucosa, *Am. J. Ortho & Oral Surg.*, 29: Sec. Oral Surg., 163-177, Mar. 1943.

146. Ziskin, D. E. and others: Oral manifestations in rats fed synthetic diets deficient in patothenic acid and biotin. I. methods, II. Gross Symptoms, *J. Nutrition*, 37:457-66, Apr. 1949.

## Abstracts

(1) Agnew, R. G. "Environment and Diet as they affect Periodontal Structures." *J.A.D.A.* 30:69-80, Jan. 1943.

This is a general report with no research studies or review of the literature. The author notes the inadequacy of diet throughout the world. He also discusses the importance of minerals, calcium, magnesium, phosphorous and the vitamins. Mention is made of endocrine dysfunction being important as a cause of periodontal disease.

(2) Bendickson, M. J. "Nutrition in Oral Health." *D. Stu. Mag.* 23:26, Jan. 1945.

The author explains how a well-balanced diet prevents caries and also affects the incidence of malocclusion. Claims that orthodontic treatment would be unsuccessful without the proper diet. Cites the oral health, jaw, and facial contour of groups from other parts of the world who do not eat our type of diet. Those with the more civilized diets have poorer oral health and malocclusions.

(3) Bjorndahl, O. "Diet and Drugs in Periodontal Treatment." *North Western Div.* 22:191-193, Oct. 1943.

This is a review of the literature. The author shows that locally detergent and systemically nutritional foods are valuable in oral health.

The author notes that today the trend is away from drugs and towards the removal of etiological factors. He remarks that repeated applications of caustics (the most commonly used drug) does more harm than good since it interferes with natural defense mechanisms.

(4) Boyle, P. E. "A,B,C,D's of Dentistry." *Harvard D. Alum. Bull.* 4:28-31, Jan. 1944.

A consideration of the results of vitamin deficiency. Refers to author's and Bessey's laboratory experiments with animals – deficiencies, etc. One conclusion is that vitamin C is proportional to dentin apposition, not enamel.

(5) "Diet for maxillo-facial cases." *Brit. D.J.* 78:209, April 1945.

Lists the foods necessary each day for a proper diet when patient has a maxillo-facial injury.

(6) Broderick, F. W. "Mode of Action of the Vitamins." *Dental Gazette* 10:330-334, April 1944
374-377, May "
418-421, June "
460-463, July "

I. Discusses colloid chemistry, the property of absorption of the colloid system and its relationship to transportation of food through the body.

II. Colloid chemistry continued. The effect of hydration, dehydration, and dispersed phase of the system on absorption, transportation, etc. Effect of disease, infection on a colloid system.

III. Mode of action of chemotherapeutic agents, etc. Refers to McDonagh's work.

IV. Vitamins – chemistry of Vincent's may be due to deficiency of B, C, or both or some other vitamins or no vitamin at all. Methods of medical research are not on a sound basis.

(7) Brown, R. W. "Adequate Vitamin Dosage." *Am. J. Ortho. & Oral Surg.* 27:336-337, Aug. 1941.

Presents symptoms of vitamin deficiencies, daily need, dosage, and course of vitamins.

Since vitamins are obtained in normal food, people who eat a fairly wide variety of foods would not necessarily be in vitamin deficiency. Adding vitamin supplements to food in the absence of disease does no good because the body will eliminate the excess. Patients in deficiency states may be placed into three categories:

1. This relates to an inadequate diet and includes people who live in poverty, eccentric individuals, psychopaths, old and lonely people, alcoholics.
2. Persons suffering from extensive lesions in G. I. tract.
3. Persons who post-operatively develop deficiency.

(8) Burwasser, P. and Hill, T. J. "The Effect of Hard and Soft Diets on The Gingival Tissues of Dogs." *J. D. Res.* 18:389-393, Aug. 1939.

Control groups of dogs were fed dog biscuits of hard consistency for 14 months. Experimental group of dogs was given the same biscuits for 14 months, but ground to a powder and mixed with water to make a mash. The animals were killed and the gingivae of

the upper jaws were examined microscopically and histologically.

Results: Jaws of the soft diet animals showed gingivitis and the gingiva was soft and dark. The epithelial papillae had definite downward extensions and there was an increase of round cell infiltration with a proliferation of the epithelial attachment down along the cementum.

The gingiva of the hard diet animals was paler and firmer and the crevice epithelium and subepithelial tissues were normal.

Conclusions: Histological findings confirm the clinical observation that soft diets tend to produce pathological changes in the gingivae.

(9) Cahn, L. "Acetylsalicylic acid as a cause of bleeding." *J. Oral Surg.* 3:336-338, Oct. 1945.

Salicylic acid is chemically related to dicoumeral and lowers the prothrombin level. Vitamin K will balance this. Therefore 1 mg. of vitamin K should be given with every 5 grains of aspirin.

(10) Camp, W. J. R. "Vitamins." *Rev. Chicago D. Soc.* 3:9, Feb. 1952.

Offers information about the various types of pharmaceuticals that are available to the profession.

Vitamins – general information: who needs what and why
Vitamin D, C, and P in dental therapy.
Ca metabolism, pregnancy and caries.
Ca, P, Vitamin D – not related to Caries. Give 1.5 grams of Ca daily in pregnancy.

(11) Chappelle, W. F. "Modern Life Requires Attention to the Rules of Diet." *D. Survey* 22:1674, Sept. 1946.

A deficiency rarely occurs in one vitamin only. Therefore in vitamin therapy, it is not necessary to diagnose a specific deficiency or give a specific medication. It should be noticed, however, which deficiencies are most severe. Many foods lose their proper vitamin and mineral content by improper farming, storage, preparation (over-refinement). Discusses function and properties of vitamins, daily requirements, actions of the vitamins, daily dosage: Vitamin A 10,000 units; Vitamin D 5,000 units; Vitamin C 30-100 mgm.; Pyridoxine 0.5 mgm.; Ca pantothenate 1.0-3.0 mgm.; Nicotinamide 10.0-20.0 mgm.

(12) Cohen, B., Fosdick, L. S. "Chemical Studies in Periodontal Disease. VI. The Glycogen content of gingival tissues in alloxan diabetes." *J. D. Res.* 29:48-54, Feb. 1950.

The object or purpose of this investigation is to ascertain whether or not gingival glycogen content undergoes alteration in the early stages of diabetes produced by intravenous administration of alloxan, as well as to pursue the possibility that the predisposition of diabetic subjects to periodontal disease might be associated with alteration in the glycogen content of the gingivae.

A group of 14 rabbits was used in this experiment. Seven were kept for controls and seven were given intravenous injection of 5% monohydrate of Alloxan. Attainment of the diabetic state was gauged by blood glucose estimations during the resting state. For corroboration, liver glycogen content was estimated concurrently with the gingival analysis of the animal sacrificed. The main blood glucose level recorded for the normal resting animal was 11.6 mg./100 cc. That of the animals treated with alloxan was 577.7 mg./100 cc.

A comparison of the respected glycogen values of liver and gingivae in the control animals appears to indicate some degree of interrelationship. However, no such correlation exists in a comparison of the respective values in the treated animals. The significance of this phenomenon could not be assessed at this time. It was concluded that the greater the glycogen content of the liver, the greater is the glycogen content of the gingivae. Also, the production of an experimental diabetic state results in a depletion of gingival glycogen. It therefore seems to follow that the manner in which diabetics may be predisposed to periodontal disease is by the depletion of the protective substance glycogen in the periodontal membrane.

(13) Connole, H. "Riboflavin in Dentistry." *D. Students Mag.* 28:13, June 1950.

A deficiency is usually not manifested in only one vitamin, but rather in combination with minerals. Riboflavin is one of the most prevalent deficiencies. A brief description is given as to how a deficiency may occur and how the dentist can recognize a riboflavin deficiency. The specific type of glossitis that may occur is discussed. Also the author considers the foods which contain significant quantities of riboflavin.

(14) Eddy, W. H. "Modern Concepts of Vitamin Behavior." *J. D. Soc. N.Y.* 8:18, May-June 1942. "Present status of Vitamin Problem." *J. 2nd Dist. D. Soc. N.Y.* 27:160, Jan. 1942.

Discusses the point that a single vitamin will not restore the individual who is suffering from a specific disease, rather one finds that you need a combination of vitamins. Classified the basic function of all vitamins in 2 categories – enzymes of the prosthetic group – and those that act as metabolites. Feels that the most significant factor is the maintenance of adequate nutrition as a whole and thus hope to eliminate disease that attacks the human subject. Feels that multiple vitamin deficiencies are difficult to diagnose and it would be quite helpful if a test of some type could be devised for inadequacy of vitamins.

(15) Faust, H. E. "The Effects of Vitamins A, C, and D on Teeth." *J. Dent. Children* 10:87, 3rd Quart. 1943.

The author attempts in this article to clear up some of the confused data about the effects of Vit. A, C, and D on teeth with special consideration to the problem of caries control. By reporting the research of many works he discusses the pros and cons of each vitamin, establishing the fact that deficiencies in A, C, and D do cause dentition abnormalities during formation but that no evidence points to caries control. He concludes by stating that from birth and until the crowns of the 3rd molars are fully formed, the diet should be as adequate nutritionally as possible for proper formation of the dentition.

(16) Field, J. "Supply and Metabolism of Ca and P." *J. Calif. Dent. Assoc.* 16:190-193, Sept., Oct. 1940.

The author presents a brief survey of some of the many aspects of absorption and utilization of Ca and P in the mammalian body.

The chief highlights of the paper are as follows:

1. The chief dietary sources of Ca and P are dairy products especially milk and cheese.
2. A factor of importance of Ca and P absorption is the acidity of the intestinal contents (Ph 4.5-5.1).
3. 99.3% of Ca and 70-80% of P of the body are contained in the skeleton.
4. The mechanism of maintaining blood Ca level is a phenomenon called homeostasis.

5. Ca in the blood is in the form of diffusible ionic Ca, non-diffusible Ca proteinate and colloidal Ca phosphate.
6. The trabeculae and not the cortex of long bones serve as the main reservoir for deposition and withdrawal of Ca and P.
7. Teeth, when fully formed, are not involved in Ca and P metabolism.
8. Factors regulating homeostasis of Ca (blood level) are parathyroid hormone concentration and Vit. D and C. Adequate Ca and P intake of thyroid hormone concentration do not affect normal blood Ca levels. An increase of parathyroid hormone concentration results in mobilization of Ca from the bones and a low concentration of parathyroid hormone permits deposition of Ca. Vit. D favors Ca retention by increased absorption and decreased excretion of Ca. Vit. C is involved in normal ossification (depositions of Ca at the epiphyseal ends of bones and in trabeculae in people with deficiency in Vit. C).
9. Ca is excreted mainly via the intestine. Phosphorous is excreted mainly via the kidneys.

(17) GUTMAN, A. B. "AN ADEQUATE CALCIUM AND PHOSPHOROUS DIETARY REGIME." *Am. J. Ortho. & Oral Surg.* 25:74-723, Aug. 1939.

The purpose of this paper is to find out what constitutes a diet adequate with respect to Ca and P with reference to the needs of normal humans and adequacy of dietary source; and if supplementary medication is indicated, how should the diet be so supplemented.

The calcium content of foods was calculated and compared with actual calcium content as determined by direct analysis. The amount of calcium in various foods that can be digested and assimilated by a normal human subject was determined and compared. The main Ca, P content of common food stuffs was also determined.

*Conclusions:* I

1. The exact determination of minimal or optimal Ca and P needs in man is subject to limitation in method, definition and individual variation. The Ca and P content of diets, as calculated from mean values assigned to component foods can only be approximated.

2. Normal phosphorous needs are not ordinarily met by average mixed diets sufficient in calories.

3. Many diets, even in people free of economic restrictions or food idiosyncrasies, appear to be sub-optimal with respect to calcium. This deficiency may be corrected by increasing the intake of milk and milk products, so that for normal adults, a pint of milk, and for growing children, a quart of milk a day is included in a balanced diet.

4. The need for supplementary Ca and P medication is rare for normal persons who follow a regimen as indicated in 3.

*Conclusions:* II

1. When there is a necessity for supplementing the diet with Ca salt (as in deficiencies in alimentary absorption or in parathyroid regulation) the Ca salts most suitable for oral administration are Ca lactate and Ca gluconate.

2. In order to facilitate the absorption of Ca salts, the most effective adjuvant is Vitamin D.

3. The amount of Vit. D required by the normal adult depends not only upon dietary intake but upon exposure to ultraviolet rays. Vit. D storage following such exposure, bile secretion, and adequacy of Ca and P intake.

(18) Harris, R. S. "Role of Nutrition in Dental and Oral Health." *J.A.D.A.* 28:424-430, March 1941.

The author discusses briefly the disorders resulting from vitamin and mineral deficiencies in humans. He shows that an adequate diet can be obtained cheaply by adding natural concentrates and synthetic materials to the foods eaten by the lowest economic level of our population. There is also a short discussion of how radioactive phosphorous is being used to trail the distribution of phosphorous in the tissues and teeth. The author briefly relates carbohydrates, vitamins, fluorine, calcium and phosphorous to dental caries.

In conclusion he stresses that dentists and physicians should always examine the mouth to detect nutritional disorders. Nutrition is of basic importance in the maintenance of dental and periodontal tissues. Dentists should be trained in this science and maintain a continuing interest in nutritional progress.

(19) "B" Complex with "C" Tablets

This has been placed on the Council's accepted list of Dental Remedies. Contains 210 mg. of ascorbic acid; 7 mg. of thiamine chloride; 14 mg. of riboflavin; 70 mg. niacinamide.

(20) Mann, A. W. "Vitamins No Cure-All in Combating Disease." Dr. A. Mann, Research Lecture, makes Chicago Debut. *Fort. Rev. Chicago D. Soc.* 7:8-15, Feb. 1944.

An address given by Dr. A. W. Mann to the Chicago Dent. Soc. Discusses pellagra, scurvy, beri-beri and riboflavin deficiencies. Gave an outline of etiology and lesions present in each deficiency. Closed by showing a film on what these lesions appear like.

(21) Laing, G. H. "Trophopathic Diseases or Systemic Nutritional Disturbances as Reflected in the Mouth." *J. Florida State D. Soc.* 21:5, May 1950.

The object of this paper is to correlate the underlying factors (enzyme systems, etc.) involved in nutritional disturbances. A common denominator as the etiologic basis for sprue, pernicious anemia, pellagra, and certain degenerative diseases of the C.N.S. is fundamentally a nutritional disturbance based on a failure of certain enzyme systems to function normally.

(22) Leonard, H. J. "Nutritional Factors Relating to Gingival and Periodontal Health and Disease." *J. Periodont.* 15:43, April 1944.

The author begins with a discussion of the three known systemic conditions which alter the periodontal tissues and lead to periodontal disease. They are scurvy, osteitis fibrosa cystica, and a highly alkaline diet. Scurvy is produced by a vitamin C deficiency and failure in formation and maintenance of intracellular connective tissue substance.

Osteitis fibrosa cystica is due to overactivity of the parathyroid gland. A highly alkaline diet results in diffuse alveolar atrophy due to a loss of calcium and phosphorous from the body.

Next discussed are the nutritional causes of excess bacterial growth on teeth and lack of resistance to their presence. These causes are "Overeating, vitamin A deficiency, thiamine deficiency, vitamin D and vitamin C deficiency.

Diet is related also to gingivitis and periodontoclasia in the cleansing abilities of the food.

(23) Lerner, H. H. "Manifestations of Deficiency Disease." *Am. J. Orth. & Oral Surg.* 27:461, Aug. 1941 (Oral. Surg. Sec.).

Vitamin A deficiency results in atrophy plus keratinization of the epithelial tissues. Hence the mechanism involving the formation of enamel is influenced by the supply of Vitamin A.

Vitamin B complex – Thiamine deficiency leads to neuritis. It is used in the treatment of facial and trigeminal neuralgias. Riboflavin deficiency produces cheilosis, and nicotinic acid deficiency produces pellagra. In alcoholics with low food intake lesions are seen in exposed parts of the body. The oral mucosa is involved. In children, early diagnosis of nicotinic acid deficiency may be ascertained by abnormal vascularity especially in the region of the mandible. Pyridoxine deficiency produces cheilitis.

Vitamin C deficiencies produces resorption of dentin. The author does not believe that bleeding gums and sponginess in scurvy are due to Vitamin C deficiency.

Vitamin K deficiencies result in abnormal bleeding.

The dental profession has a great opportunity to recognize these deficiencies and the best treatment is institution of a normal diet plus, in certain cases, prescription of synthetic substitutes:

| | |
|---|---|
| Vitamin A – 20,000 I.U./day | Nicotinic Acid 500 mg./day |
| Thiamine – 1 mg./day | Pyridoxin 50 mg./day |
| Riboflavin – 5 mg./day | Ascorbic Acid 75 mg./day |

(24) Nelson, F. C. and Pecchenino, J. W. "Restoring Lost Tone to Gingival Tissue." *Contact Point* 21:83, Aug. 1943.

This article considers 3 methods of restoring lost tone to gingival tissue; Oxygenation of inflamed gingival tissue; vitamin C therapy; radiation therapy. With regard to vitamin C therapy it is of value in scorbutic infants, gingival swelling and repair of hemorrhage due specifically to a vitamin C deficiency.

(25) Radusch, D. F. "Nutrition and Dental Health." *J. Periodont.* 16:136, Oct. 1945.

Discusses Vit. A – authors and history of this vitamin. Considers how vit. A is affected by mineral oil, cooking. The source of vitamin A and the relationship of vitamin A to cutaneous lesions is discussed. The author concludes, after a review of the literature, that tissues of the stratified keratinized type cannot undergo keratinized metaplasia such as occurs in single layered epithelial tissue as a result of vitamin A deficiency.

(26) SINCLAIR, J. A. "PYORRHEA — A NON-SURGICAL AND NON-CURETTAGE TREATMENT." *D. Items of Interest* 63:666, July 1941.

The removal of the extrinsic factors and control of intrinsic factors in pyorrhea can control the disease. Method: administration of Vit. C coupled with the application of 2.0 engenol paste around the teeth into the pockets for a few days. When paste is removed pockets look wide open and can be easily cleansed and polished. Bathe root surface with a saturated solution of iron sub sulphate. Pack wound and let alone for one week. Then remove and pack again for one month.

Important intrinsic and extrinsic factors involved in pyorrhea lesion are discussed. A partial review of the literature in Vit. C is given. Necrotic tissue and bacterial growth in a necrotic area are set forth as the important extrinsic factors in all periodontal lesions.

(27) WELLS, C. R. "VITAMIN AND DRUG THERAPY FOR DENTAL AND ORAL CONDITIONS." *J. 2nd Dist. D. Soc. N.Y.* 27:362, May 1942.

Discussion was confined mainly to drug dosages: Prophylactic dose for well being:

Vitamin A – 10,000 units
Vitamin D – 1,700 units/day
Vitamin $B_1$ – 5,000 units 2-3-4 times/day
Nicotinic acid maximal dose – 1 gm./day; vitamin C – 500 mgm./day
Vitamin K – for hemorrhage – 6 mgms. every 6 hours.